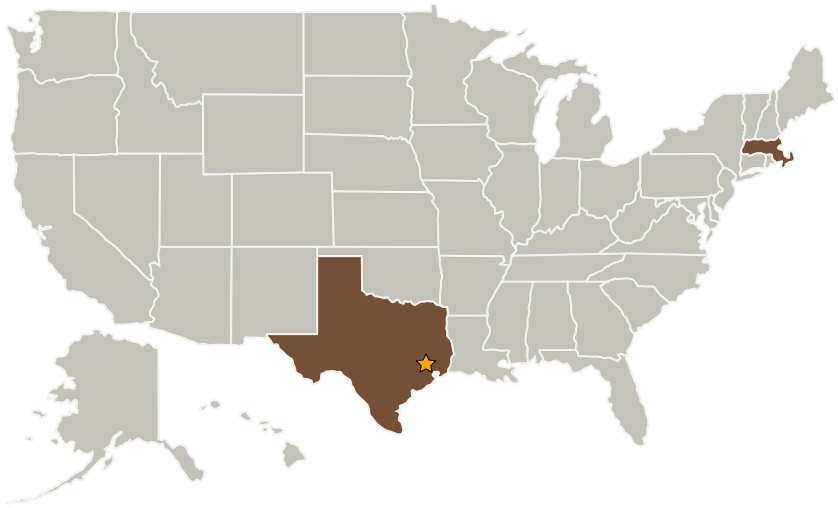
Tissue-Equivalent Radiation Dosimeter-On-A-Chip, Phase II

Completed Technology Project (2008 - 2010)

Project Introduction

Available digital dosimeters are bulky and unable to provide real-time monitoring of dose for space radiation. The complexity of space-flight design requires reliable, fault-tolerant equipment capable of providing real-time dose readings during a mission, which is not feasible with the existing thermo-luminescent dosimeter (TLD) technology, especially during extravehicular activities (EVA). Real-time monitoring is important for low-Earth orbiting spacecraft and interplanetary space flight to alert the crew when Solar Particle Events (SPE) increase the particle flux of the spacecraft environment. The Phase-II project will design and fabricate a prototype Dosimeter-on-a-Chip (DoseChip) for personal dosimetry comprised of a tissue-equivalent scintillation crystal coupled to a solid-state photomultiplier (SSPM). The ubiquitous nature of CMOS technology provides a standardized development platform, and the ability to integrate the supporting electronics into a miniature, lightweight design. The DoseChip provides a tissue-equivalent response to the relevant energies and types of radiation for low-Earth orbit and interplanetary space flight to the moon or Mars and will be sensitive to the dose rates and particle fluxes of ambient Galactic Cosmic Rays (GCR) to the higher rates of major SPE. The DoseChip will complement the existing Crew Passive Dosimeters by providing real-time dosimetry and as an alarming monitor for SPE.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Radiation Monitoring Devices, Inc.	Supporting Organization	Industry	Watertown, Massachusetts

Primary U.S. Work Locations	
Massachusetts	Texas

Project Transitions

February 2008: Project Start

February 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.5 Radiation
    - TX06.5.5 Monitoring Technology